

## **Stakeholder Working Group, February 27, 2007**

### **Description of Options for Reducing Emissions from the Industrial Sector (RCI-60 to 85)**

The Utah Department of Natural Resources analysis of GHG emissions summarized industrial sector emissions as follows:

Utah's industrial sector is forecast to release 23.3 million tons of CO<sub>2</sub> by the year 2010, up from 15.3 million in 1990. This represents a total increase of roughly 52.3 percent, or about 2.6 percent per year. The industrial sector accounted for approximately 38 percent of all CO<sub>2</sub> emissions in 1990 and is projected to account for 32 percent of the expected 69.9 million tons in 2010.

The Utah industrial sector offers several promising opportunities for energy-efficiency improvements. Because of the wide variation in production processes and in energy use between firms in a given industrial category (e.g. steel or refineries) and across different industries, it is relatively difficult to generalize about energy efficiency opportunities.

Across all industries and fuels, industrial process heating accounts for the greatest fraction of CO<sub>2</sub> emissions (41 percent), followed closely by general processes including conveyance, air compression, and motor-related applications (34 percent). Space heating represents 10 percent. Water heating and process cooling each represent 3 percent of the total. Collectively, these five processes account for 81 percent of all CO<sub>2</sub> emissions in the industrial sector.

Industries generally consume primary energy in the form of fossil fuels for process or heating applications. Secondary energy, in the form of electricity, is used for a wide variety of processes such as conveyance, heating, and cooling. Other important energy uses include space conditioning (heating and cooling), ventilation, and water heating. Both energy forms are converted into trillion Btus (Tbtus). By Standard Industrial Classification SIC category, the following industries are the largest consumers of energy in the state:

<b>Category</b>	<b>Total Energy Tbtus, 1998</b>
Petroleum and Coal Products	44.37
Chemical and Allied Products	37.30
Paper and Allied Products	18.66
Primary Metal Industries	17.23
Food and Kindred Products	8.35
Stone, Glass, and Clay Products	6.61
Lumber and Wood Products	3.44
Fabricated Metal Products	2.57
Transportation Equipment	2.54
Textile Mill Products	2.17
Rubber and Misc. Plastics Products	2.01

## **Improve Efficiency and Increase Use of Lower-GHG Fuels**

### **RCI-60**

**Name:** Promotion and Tax or Other Incentives (e.g. Energy Star, credits for solar hot water)

**Definition/examples:** Any program designed to increase energy efficiency and renewable energy resources within the state or even on a local level. Financial incentive programs can include revolving loan funds, energy performance contracting, tax incentives, grants, supplemental environmental projects (SEP) to offset adverse environmental impacts of projects, nitrogen oxide set asides, as well as grants, buy-downs, and generation incentives. Other options include public education and outreach programs, standardization and streamlining of interconnection and permitting processes for clean energy, partnering with financial institutions, installers, and equipment providers. Funding for these programs could come from a variety of sources, including a public benefit fund (PBF), utility program funds, or state revenues. See [http://www.epa.gov/cleanenergy/pdf/gta/guide\\_action\\_full.pdf](http://www.epa.gov/cleanenergy/pdf/gta/guide_action_full.pdf).

Energy Star is a federal program designed to help state/local governments, businesses, and schools achieve energy management that saves money and reduces environmental impact. Energy Star offers information, technical assistance, and outreach that enable participants to make financially attractive improvements to their facilities.

[http://www.epa.gov/cleanenergy/pdf/gta/guide\\_action\\_full.pdf](http://www.epa.gov/cleanenergy/pdf/gta/guide_action_full.pdf)

Arizona provides a 10% tax credit for the installation of solar and wind power industrial appliances, up to \$25,000. The Arizona Department of Commerce administers the program. Commercial/Industrial Solar & Wind Tax Credit (Corporate). See Arizona Incentives for Renewables and Efficiency. Accessed on Feb. 20, 2007 at [http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive\\_Code=AZ18F&state=AZ&CurrentPageID=1&RE=1&EE=1](http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=AZ18F&state=AZ&CurrentPageID=1&RE=1&EE=1).

The New Mexico climate change report does not offer a cost analysis for this policy option; costs for more specific programs such as incentives for building performance, and distributed and centralized renewables can be found at: (

<http://www.nmclimatechange.us/ewebeditpro/items/O117F10150.pdf>

**Volume of Emissions in Utah:**

**Benefit/cost of reducing CO<sub>2</sub> —cost per ton reduced:**

**How implementable the option is in Utah:**

**Impacts, distribution of burdens, co-benefits:**

**Other comments/assessments:**

## **RCI-61**

**Name:** Improvements in industrial lighting

### **Definition:**

*High-Efficiency Lighting Retrofit:* This strategy seeks to replace existing magnetic ballasts and 112 F34 fluorescent lamps with electronic ballasts and T8 F32 lamps. Wherever feasible, incandescent lamps should be replaced with compact fluorescent lamps (CFLs). There are now CFLs available to fit in almost any incandescent fixture. A screw-in ballast adapter can be used or the fixture can be retrofit with a built-in ballast. There are now dimmable units as well. Compact fluorescent lamps have a projected life span that is 10-15 times longer than incandescent lamps making operation and maintenance savings significant. The payback on retrofits of fixtures operated about 12 hours per day is less than 6 months. High bay or outdoor lighting systems that use incandescent, mercury vapor, or fluorescent lamps may be replaced with high-efficiency High Intensity Discharge (HID) systems using metal halide, high pressure sodium, or low pressure sodium fixtures. Exit lights should be retrofit with LED units. These are more expensive but are very cost effective given their extremely long life and low energy requirements (on the order of two watts) (Utah, 2000).

The Arizona Energy Conservation Savings Reinvestment Plan for the City of Phoenix, started in 1984, provides secure and long-term loans for energy-efficiency initiatives under the Energy Management Program. Under this plan, 50 percent of all documented energy savings (up to \$750,000) must be reinvested in further efficiency improvements. All municipal departments in Phoenix are eligible. Eligible projects include upgrading lighting, motors and chillers, among other upgrades. Source: <http://www.iclei.org/index.php?id=1677&0>

California's recently updated Building Energy Efficiency Standards include new requirements for outdoor lighting. The requirements vary according to which "Lighting Zone" the equipment is in. The Standards contain lighting power allowances for newly installed equipment and specific alterations that are dependent on which Lighting Zone the project is located in. Existing outdoor lighting systems are not required to meet these lighting power allowances. However, alterations that increase the connected load, or replace more than 50% of the existing lights, for each outdoor lighting application that is regulated by the Standards, must meet the lighting power allowances for newly installed equipment.

[http://www.energy.ca.gov/title24/2005standards/outdoor\\_lighting/2004-09-07\\_NOTICE\\_LIGHTING.PDF](http://www.energy.ca.gov/title24/2005standards/outdoor_lighting/2004-09-07_NOTICE_LIGHTING.PDF)

### **Volume:**

**Cost:** A high-efficiency lighting retrofit strategy has the potential to reduce CO<sub>2</sub> emissions 94,000 tons at \$5/ton and a feasible reduction of 59,000 tons of CO<sub>2</sub> at \$6/ton (Utah, 2000).

### **Implementable**

### **Impacts:**

### **Other comments:**

**RCI-62**

**Name:** Bulk Purchasing Programs

**Definition:**

The New York State Energy Research and Development Authority (NYSERDA) has an energy efficiency program called the Energy Star® Products Bulk Purchasing program that seeks to “increase the availability and promotion of energy-efficient products for multifamily building customers, builders, and community-based organizations” by helping them participate in the bulk purchase bid process, and provides incentives to purchase Energy Star® products.

<http://www.nyserda.org/Funding/659RFP.html>.

**Volume:**

**Cost:**

**Implementable:**

**Impacts:**

**Other comments:**

**RCI-63**

**Name:** Utility/DSM Programs

See RCI-2

**Definition:** DSM programs can cover a wide range of energy efficiency and conservation efforts. Performance based incentives, efficiency portfolio standards, energy trusts, decoupling of rates and revenues, and appropriate rate treatment for efficiency, are examples of utility/DSM programs. The goal of a utility/DSM (Demand Side Management) program is typically to secure additional investment in energy efficiency programs in order to secure cleaner energy at a lower cost. Some DSM programs are funded through a Public Benefit Fund (PBF). PBFs levy a small charge on a consumer's electricity bill in order to secure funding for investment in energy efficiency programs. Charges are typically equivalent to a \$.27 to \$2.50 charge on a residential consumer's monthly energy bill. Utilities can undertake a similar program by contributing a small amount of their retail (such as 1%) to DSM programs within their base of operations. ( <http://www.nmclimatechange.us/ewebeditpro/items/O117F10150.pdf>) ([http://www.epa.gov/cleanenergy/pdf/gta/guide\\_action\\_full.pdf](http://www.epa.gov/cleanenergy/pdf/gta/guide_action_full.pdf))

A DSM may be independently administered by a utility but typically is enacted by state legislation in the form of a PBF. Once this is done, utilities implement a PBF by processing charges, administering the fund, and implementing energy efficiency measures. Non-profit organizations may also play a role in the administration of DSM programs. The state and utilities then must decide the level and range of the charge to consumer energy bills. An EPA report recommends that program administrators have flexibility to determine the allocation of resources if the program is to be cost effective and have maximum effect. See [http://www.epa.gov/cleanenergy/pdf/gta/guide\\_action\\_full.pdf](http://www.epa.gov/cleanenergy/pdf/gta/guide_action_full.pdf); [http://www.swenergy.org/pubs/Natural\\_Gas\\_DSM\\_Programs\\_A\\_National\\_Survey.pdf](http://www.swenergy.org/pubs/Natural_Gas_DSM_Programs_A_National_Survey.pdf);

**Volume:**

**Cost:**

NM: -\$18/ton of CO<sub>2</sub>

**Implementable:**

**Impacts:**

**Other comments:**

**RCI-64**

**Name:** Market transformation and technology development programs, industry coalitions

**Definition:**

The Arizona Coalition for New Energy Technologies includes large corporations, small businesses, and non-profit organizations as its members. The Arizona Coalition promotes the development of innovative technologies and attempts to influence state and federal leaders. The Arizona Solar Energy Association is the largest solar association in the United States and attempts to educate people about solar energy. The Arizona Solar Energy Industries Association (AriSEIA) is a non-profit trade association representing local, national and international solar companies in the Arizona market. The group's focus is on education, professionalism and promotion of public policies that support deployment of solar technologies in Arizona.  
<http://www.azsolarcenter.com/arizona/modules/eps.html>

Arizona Industries of the Future, Inc. (AZIOF) is an industry-led non-profit organization, created by members of the Agriculture, Aluminum, Forestry and Mining Industries of the Future Steering Committees. AZIOF is pursuing various policy options in the aluminum, forestry, agriculture and mining industries. The AZIOF Aluminum industry, for example, seeks to develop an aluminum-recycling program, investigate applied solar concentrated process heat, improve processing (re-utilization of process heat), promote research and development in energy savings, and partner with the Arizona Dept. of Commerce Energy Office, utility companies and U.S. Dept. of Energy to educate the aluminum industries about potential energy savings. AZIOF will promote RD&D in energy saving technologies and applications of renewable technology in Arizona's mining industries. Through its partnerships, efforts will be made to assist industries in locating funding for qualified projects. See Arizona Industries of the Future. Available at <http://www.aziof.com/>

California utilities worked together to develop uniform standards for net metered customers in order to streamline the process of net metering throughout the state.  
[http://www.cpuc.ca.gov/WORD\\_PDF/REPORT/45133.PDF](http://www.cpuc.ca.gov/WORD_PDF/REPORT/45133.PDF).

**Volume:**

**Cost:**

**Implementable:**

**Impacts:**

**Other comments:**

**RCI-65**

**Name:** Focus on specific end-uses: motors, pump systems, boilers, steam system upgrades, process-specific equipment.

**Definition:**

*Motors:* The primary strategy with respect to motors is to optimize motor system efficiency, particularly in pump systems, fan systems, and compressed air systems. System efficiency can be improved by reducing the overall load on the motor through improved process or system design, improving the match between component size and load requirements, use of speed control instead of throttling or bypass mechanisms, and better maintenance. In 1994, electric motor-driven systems used in industrial processes consumed 679 billion kWh or 23 percent of all electricity sold in the United States. These machines comprise by far the largest single category of electricity end use in the national economy. According to the EPA's Motor Challenge Program, industrial motor energy use could be reduced by 11 to 18 percent if all cost-effective applications of mature and proven energy efficiency technologies and practices were adopted.

There are two basic categories of motor system energy efficiency measures: motor efficiency upgrades and system efficiency measures. The former improve the energy efficiency of the motor driving a particular machine or group of machines. The latter improve the efficiency of a machine or group of machines as a whole. System efficiency can be improved by reducing the overall load on the motor through improved process or system design, improving the match between component size and load requirements, use of speed control instead of throttling or bypass mechanisms, and better maintenance, to name just a few of the available strategies. According to Motor Challenge, motor efficiency improvements alone can lower energy by 2.9 percent. Improved methods of rewinding can account for another 1 percent consumption. Energy savings from system-wide efficiency improvements can gain another 9 percent. Overall, these improvements could gain as much as 13 percent energy savings.

In Utah, electricity is the primary form of energy used in industrial processes. Together with transmission and distribution (T&D) losses, electricity accounts for 83% of all energy consumed in the industrial sector. The primary strategy with respect to motors is to optimize motor system efficiency, particularly in pump systems, fan systems, and compressed air systems. System efficiency can be improved by reducing the overall load on the motor through improved process or system design, improving the match between component size and load requirements, use of speed control instead of throttling or bypass mechanisms, and better maintenance (Utah, 2000).

**Volume:**

**Cost:** The industrial sector HVAC motor strategy could result in a feasible reduction of 82,000 tons of CO<sub>2</sub> at a cost of \$26 per ton (Utah, 2000).

**Implementable:****Impacts:****Other comments:**

**RCI-66**

**Name:** Focus on Small and Medium Enterprises (SMEs)

**Definition:**

The Industrial Assessment Center (IAC) at Arizona State University provides free energy, waste and productivity analysis studies to qualified Arizona and Nevada Manufacturers, recommending methods to conserve resources, and reduce operating costs. Funding comes from the US Department of Energy. On average, implemented recommendations from assessments performed by the IAC at ASU saved each customer about \$65,000 per year. See

<http://www.eas.asu.edu/~iac/index.html>

In Arizona's Energy Advisor program, small to medium-sized businesses (those under 20,000 square feet) whose peak summer demand is less than 100 kilowatts can receive an on-site energy audit and computer analysis of cost-effective energy efficiency measures for \$150 through SRP's Energy Advisor program. See <http://www.swenergy.org/programs/arizona/utility.htm>

**Volume:**

**Cost:**

**Implementable:**

**Impacts:**

**Other comments:**

**RCI-67**

**Name:** Promotion and Incentives for Improved Design and Construction (e.g. LEED, green buildings, expedited permitting)

**Definition:**

Building energy codes specify minimum energy efficiency requirements for new buildings or for existing buildings undergoing major renovations. The Arizona Climate Change Advisory Group recommended (1) improved and increasingly stringent energy efficiency codes for Arizona, (2) LEED (Leadership in Energy and Environmental Design) standards/certifications and/or other “green building” certifications and/or measured or modeled building energy performance criteria to specify building energy performance standards, (3) a performance standard for State-owned or state-leased buildings to demonstrate the feasibility of not only achieving the minimum code requirements but also significantly exceeding code requirements, (4) a requirement that State-owned or leased facilities use life-cycle costing, including full consideration of future energy costs, in the selection and implementation of building designs and components (including energy using equipment such as heating, ventilation and air conditioning systems) for both new and renovated space, or for the selection of replacement components and that the most cost-effective design/equipment/component options be chosen., and (5) financial or tax incentives for non-public and non-state public buildings (such as municipal buildings) to improve their energy performance beyond that required by existing codes. See <http://www.azclimatechange.us/ewebeditpro/items/O40F9347.pdf>

Scottsdale, AZ has a green building program to “minimize environmental impact and reduce the energy consumption of buildings while contributing to the health of its occupants.” The program is completely voluntary. Buyers receive a variety of tax incentives, depending on the amount of “green” in their home, including a property tax deduction and financial incentives to install solar power equipment. Builders wishing to “build green” receive fast track plan review service, so that the builders receive building permits in half the time; job site signs distinguishing their projects as being green; the city publishes a directory of green designers and builders; and the city sponsors educational programs and lectures about building green. See <http://www.scottsdaleaz.gov/greenbuilding/Incentives.asp>.

California offers integrated energy design incentives to reward exceptional design accomplishments through its Savings By Design program, which offers special design assistance as well as financial incentives to design teams. The design team qualifies for incentives when the building design saves at least 15%. Incentives range from \$.03 - .06/annualized kWh savings and \$.15 - .27/annualized therm savings as the design becomes more efficient. The maximum incentive per project is \$50,000. <http://www.savingsbydesign.com/teamincen.htm>

**Volume:****Cost:****Implementable:****Impacts:****Other comments:**

**RCI-68**

**Name:** Support for switching to less carbon-intensive fuels (coal and oil to natural gas or biomass)

**Definition:**

In 2005, the CA Biomass Collaborative was initiated in order to develop an integrated and comprehensive state policy on biomass, which includes electricity, natural gas and petroleum substitution potential. The policy should also address potential benefits, such as reducing municipal solid waste, which a wide range of conversion technologies can capture. State goals have been set regarding biofuels at a minimum of 20 percent production within CA by 2010, 40 percent by 2020, and 75 percent by 2050. With regard to biomass use for electricity, the state goal is a 20 percent target within established state goals for 2010 and 2020. The project is still within the research phase. The Bioenergy Interagency Working Group consists of representatives from the Air Resources Board, California Energy Commission, California Environmental Protection Agency, California Resources Agency, Department of Food and Agriculture, Department of Forestry and Fire Protection, Department of General Services, Integrated Waste Management Board, Public Utilities Commission, State Water Resources Control Board. Greenhouse gas reduction is to be specifically addressed by the group with respect to biofuels in transportation, stationary and energy sectors. The first reports are due in June of 2007. A peer reviewed study and CBA is due by July 31, 2008.

[http://www.energy.ca.gov/bioenergy\\_action\\_plan/index.html](http://www.energy.ca.gov/bioenergy_action_plan/index.html)

<http://www.energy.ca.gov/2006publications/CEC-600-2006-010/CEC-600-2006-010.PDF>

**Volume:****Cost:****Implementable:****Impacts:****Other comments:**

**RCI-69**

**Name:** Improved Building Codes, Training and Enforcement

**Definition:**

Improved building codes require new buildings to meet minimum energy efficiency requirements and could also be applied to existing buildings undergoing renovations. Codes usually address improvements in “thermal resistance” in the exterior and windows, air leakage, and heating and cooling efficiencies. See ([http://www.epa.gov/cleanenergy/pdf/gta/guide\\_action\\_full.pdf](http://www.epa.gov/cleanenergy/pdf/gta/guide_action_full.pdf))

The AZ Climate Change Advisory Group recommended that Arizona adopt a statewide code or strongly encourage municipalities to adopt and maintain improved building codes. The CCAG also recommends that Arizona or the municipalities adopt the 2004 International Energy Conservation Code (IECC), and consider adopting innovative features of California’s latest Title 24 building energy codes, such as lighting efficiency requirements in new homes. In addition, the CCAG recommends that Arizona and local jurisdictions should update energy codes regularly, such as a three-year cycle of review based on the national model codes release. See <http://www.azclimatechange.us/ewebeditpro/items/O40F9347.pdf>

Arizona is a “home-rule state” meaning that the municipalities are able to adopt and enforce their residential and commercial building energy codes. According to the Southwest Energy Efficiency Project (SWEET), Arizona passed legislation encouraging local governments to voluntarily adopt of the 2000 International Energy Code (IECC) and ASHRAE Standard 90.1-1999. State government buildings must comply with ASHRAE Standard 90.1-1999, the most recent and model standard for energy efficiency in commercial buildings. See Southwest Energy Efficiency Project (SWEET). <http://www.swenergy.org/>

In California, Energy Efficiency Standards for Residential and Nonresidential Buildings were established in 1978 in response to a legislative mandate to reduce energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. The first phase of the development process will include a series of public workshops, while the second phase will present draft language for the 2008 Standards based on the discussions in the first phase and will offer opportunities for further public input. The third phase will be the formal rulemaking for which final proposed language for the 2008 Standards. California's building efficiency standards (along with those for energy efficient appliances) have saved more than \$56 billion in electricity and natural gas costs since 1978. It is estimated the standards will save an additional \$23 billion by 2013.

<http://www.energy.ca.gov/title24/index.html>

**Volume:**

**Cost: NM:** -\$12/ton of CO<sub>2</sub>

**Implementable:****Impacts:****Other comments:**

**RCI-70**

**Name:** Energy Management Training / Training of Building Operators

**Definition:**

Building Operator Certification (BOC) is a professional development program in the energy efficient operation of building systems to qualify facilities professionals for certification. BOC is a growing national program, now in 16 states including Washington, Oregon, California, Illinois, Ohio, New York, New Jersey, and Massachusetts. In California, Building Operator Certification is offered at two levels. The first typically is \$1,095 per participant, and \$795 for a second registrant or more from the same company. The registration fee includes 56 hours of classroom instruction, seven course handbooks, facility project assignments, and certification recognition materials. BOC Level two is billed at the same rate and involves 49 hours of classroom instruction, six course handbooks, facility project assignments, and certification recognition materials. There are also free seminars available through public utilities, which include both classroom style and web-based training style instruction. There is also a free Savings By Design program which provides design assistance to commercial, industrial, agricultural building owners to promote energy efficient design and construction practices also provided by local utilities. Major employers across the country are sending operators to BOC training for certification. See [http://www.theboc.info/ca/fees\\_ca.html](http://www.theboc.info/ca/fees_ca.html)  
<http://www.fypower.org/inst/gov.html>;  
[http://www.fypower.org/inst/tools/rgl\\_results.html?z=92507&s=inst&c=Education](http://www.fypower.org/inst/tools/rgl_results.html?z=92507&s=inst&c=Education);  
[http://www.fypower.org/inst/tools/rgl\\_results.html?z=92507&s=inst&c=Project%20Design%20Assistance](http://www.fypower.org/inst/tools/rgl_results.html?z=92507&s=inst&c=Project%20Design%20Assistance)

**Volume:****Cost:****Implementable:****Impacts:****Other comments:**

**RCI-71**

**Name:** Energy Tracking and Benchmarking

**Definition:**

An energy profile provides the basic building block of information needed to begin evaluating a property's potential for energy savings. This information also helps determine baseline energy performance and can be used to benchmark a building's performance against comparable properties. An energy accounting system records information from the energy profile over time. An energy accounting system is generally kept in a simple spreadsheet or tracked through computer software. Buildings equipped with an energy management system may be able to use this to automatically generate real-time information for an energy accounting system. Once ECMs or EEMs have been installed, this historical record enables energy managers to later measure program results against baseline performance. It can also indicate when problems arise, such as through abnormally high energy costs related to equipment failure. Added components of an energy accounting system may include monthly or more frequent energy-use and cost reports, changes in occupancy or facility usage, utility rate schedules, and performance tracking of major equipment systems. See: Fire Your Power: Commercial Office Buildings, Available at [http://www.fypower.org/bpg/module.html?b=offices&m=Planning\\_an\\_Energy\\_Program&s=Energy\\_Profiles](http://www.fypower.org/bpg/module.html?b=offices&m=Planning_an_Energy_Program&s=Energy_Profiles)

The Online Commercial Energy Profile Analysis Program through local CA utilities provides an online tool to analyze company's energy use and provide customized recommendations for reducing energy consumption and costs to large customers free of charge. Depending upon the utility service area, small and medium customers can choose from an online, phone, mail-in, CD-ROM or on-site audit, while large customers can request a technical consultant to conduct more targeted evaluations and generate customized energy-saving recommendations. There is also a Free Commercial Energy Systems Library, which contains thousands of pages of information in a format designed to make the information interesting and easily accessible. It is also possible to borrow state-of-the-art monitoring equipment inexpensively for up to 30 days from local CA utilities.

[http://www.fypower.org/inst/tools/rgl\\_results.html?z=92507&s=inst&c=Audits](http://www.fypower.org/inst/tools/rgl_results.html?z=92507&s=inst&c=Audits)

[http://www.fypower.org/inst/tools/rgl\\_results.html?z=92507&s=inst&c=Diagnostic%20%26%20Measurement%20Tools](http://www.fypower.org/inst/tools/rgl_results.html?z=92507&s=inst&c=Diagnostic%20%26%20Measurement%20Tools)

**Volume:**

**Cost:**

**Implementable:**

**Impacts:**

**Other comments:**

## **RCI-72**

**Name:** Incentives for Renewable Energy Applications (Solar roofs, etc.)

**Definition:** Incentives to encourage investment and the application of renewable energy include: 1) direct subsidies for the purchase/sale of renewable energies. 2) tax credits or exemptions given for the purchase of renewable technologies. 3) regulatory policies that provide assurance of cost recovery to the purchaser of renewable technologies. Research and development funding for distributed renewables could also fall under this policy option.

(<http://www.nmclimatechange.us/ewebeditpro/items/O117F10150.pdf>)

A Phoenix-based utility launched the SRP SolarWise Energy program, which will partly reimburse residential and small business customers who purchase and install photovoltaic systems that interconnect with the SRP's system. Customers will be offered \$3,000 for a one-kilowatt system, \$6,000 for a two-kilowatt system and \$9,000 for a three-kilowatt system. A typical photovoltaic system of one to three kilowatts costs between \$7,000 and \$21,000. Those who install a new solar water heating system will receive a \$750 payment, with such a system costing about \$3,000. See [www.srpnet.com](http://www.srpnet.com).

Arizona provides a sales tax exemption for the retail sale of solar energy devices and for installation of solar energy devices by contractors. The statutory definition of "solar energy device" includes wind electric generators and wind-powered water pumps in addition to daylighting, passive solar heating, active solar space heating, solar water heating, and photovoltaics. The sales tax exemption does not apply to batteries, controls, etc., that are not part of the system. See

[http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive\\_Code=AZ08F&state=AZ&CurrentPageID=1&RE=1&EE=0](http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=AZ08F&state=AZ&CurrentPageID=1&RE=1&EE=0)

Arizona's Solar Energy Credit provides an individual taxpayer with a credit for installing a solar or wind energy device at the taxpayer's Arizona residence. The credit is allowed against the taxpayer's personal income tax in the amount of 25% of the cost of a solar or wind energy device, with a \$1,000 maximum allowable limit, regardless of the number of energy devices installed. The credit should be claimed in the year of installation and if the amount of the credit exceeds a taxpayer's liability in a certain year, the unused portion of the credit may be carried forward for up to five years. Qualifying technologies include solar domestic water heating systems, solar swimming pool and spa heating systems, solar photovoltaic systems, solar photovoltaic phones and street lights, passive solar building systems(excluding conventional skylights), wind generators, and wind powered pumps.

**Volume:**

**Cost:**

**Implementable**

**Impacts:**

**Other comments:**

**RCI-73**

**Name:** Industry-Specific Emissions Cap and Trade Programs

This might best be addressed as a cross-cutting issue.

**Definition:**

**Volume:**

**Cost:**

**Implementable:**

**Impacts:**

**Other comments:**

**RCI-74**

**Name:** Negotiated Agreements

See RCI-5

**Definition:**

**Volume:**

**Cost:**

**Implementable:**

**Impacts:**

**Other comments:**

**RCI-75****Name:** Green Power Purchases

See RCI-6

**Definition:** Green power offers customers the opportunity to buy electricity generated from sources that emit no CO<sub>2</sub>. Typical examples include non-emitting nuclear generation, large hydroelectric facilities, and renewable resources such as wind, geothermal, biomass, and small hydro. See [http://www.pge.com/about\\_us/environment/features/clean\\_energy.html](http://www.pge.com/about_us/environment/features/clean_energy.html).

Programs to promote the purchase of green power could include: 1) Education to increase the level of consumer awareness of green energy benefits and options, 2) Requiring utilities to provide information on fuel sources and their emissions to consumers, 3) The formation of large customer buying groups or aggregation, 4) The verification of the claims regarding a green energy product in order to protect the consumer, 5) States agencies can purchase green power to meet their own needs thus helping to form the renewable market. State legislatures have enacted legislation permitting or even requiring the provision of green power by utilities or distribution companies. Provided they have authority, public utility commissions can require utilities to offer green power options. The EPA outlines three basic steps to program implementation: 1) Establish a baseline. Is there a demand for green power products? If there are none available locally, are consumers buying renewable energy credits (RECs) from the international market? 2) Convene interested stakeholders to establish goals and attributes for a program. 3) Monitor the success of the green market. This could include number of customers by customer class, kWh sold, MW of new generation developed, etc. A state agency can be established to oversee implementation of a program, ensure consumer protection, and substantiate green power claims. Non-profit organizations can also be enlisted to help, especially in the dissemination of green power information to the general public. See [http://www.epa.gov/cleanenergy/pdf/gta/guide\\_action\\_full.pdf](http://www.epa.gov/cleanenergy/pdf/gta/guide_action_full.pdf)

A number of Arizona power companies provide the option for their customers to purchase green power. APS and the City of Scottsdale have agreed to build 406 kilowatts (kW) of solar generation at the City's facilities. The City also purchases more than 40 megawatt-hours of solar energy annually under the APS Solar Partner<sup>®</sup> program. See [http://www.aps.com/my\\_community/Solar/Solar\\_27.html](http://www.aps.com/my_community/Solar/Solar_27.html)

**Volume:****Cost:** NM: \$7/ton CO<sub>2</sub>**Implementable:****Impacts:****Other comments:**

**RCI-76**

**Name:** Clean Combined Heat and Power

**Definition:** Because virtually all industries require electricity in addition to thermal energy, combined heat and power (CHP) projects have become popular strategies for reducing energy consumption. CHP refers to the sequential production of thermal and electric energy from a single fuel source. In the CHP process, heat is recovered that would normally be lost in the production of one form of energy. For example, in the case of an engine configured to produce electricity, heat could be recovered from the engine exhaust and used for processes or water heating, depending in part on the exhaust temperature. The recycling of waste heat differentiates CHP facilities from central station electric facilities. The overall fuel utilization efficiency of CHP plants is typically 70-80 percent versus 35-40 percent for utility power plants. The basic components of any CHP plant include a prime mover, a generator, a waste heat recovery system, and operating control systems. Typically, CHP systems are configured around three basic types of generators: 1) steam turbines; 2) combustion gas turbines; and 3) internal combustion engines.

A representative CHP project for Utah industrial customers would likely consist of a facility rated at less than 12 MW with a capacity factor of approximately 80%. These systems are primarily internal combustion engines or combustion turbines, generally using natural gas of fuel. Such systems reduce energy purchases and may also increase the reliability of electric power deliver. In many cases, industries benefit from sell back tariffs which compel investor-owned or public utilities to purchase excess electricity. Historically, these sell back tariffs have figured prominently in the decision to develop CHP projects (Utah, 2000).

**Volume:**

**Cost:**

**Implementable:**

**Impacts:**

**Other comments:**

**RCI-77**

**Name:** Industrial ecology/ by-product synergy

**Definition:** One consulting company defined these terms this way:

By-product synergy has been defined by the World Business Council for Sustainable Development and the US Environmental Protection Agency as 'the synergy among diverse industries, agriculture, and communities resulting in profitable conversion of by-products and wastes to resources promoting sustainability'. By-product synergy is the principle which underpins the concept of 'industrial ecology' - a holistic view of industry in which organizations exchange energy and material between one another, rather than operating as isolated units. Industrial ecology promotes a shift away from traditional open, linear systems towards closed loops and inter-dependent relationships of the kind found in nature. To date, the best known demonstration of industrial ecology is in the Danish industrial town of Kalundborg. However, a recent study by the US Environmental Protection Agency suggests that the potential for exploiting by-product synergies among co-located industries may be substantial. See

[http://www.bsdglobal.com/tools/bt\\_synergy.asp](http://www.bsdglobal.com/tools/bt_synergy.asp)

**Volume:**

**Cost:**

**Implementable:**

**Impacts:**

**Other comments:**

**RCI-78**

**Name:** Cement Industry: Clinker reduction/substitution, use of alternative fuels

**Definition:** In a study entitled “Energy efficiency and carbon dioxide emissions reduction opportunities in the U.S. cement industry, “ the authors

examined 30 energy efficient technologies and measures and estimated energy savings, carbon dioxide savings, investment costs, and operation and maintenance costs for each of the measures. They constructed an energy conservation supply curve for U.S. cement industry which found a total cost-effective reduction of 0.6 GJ/ton of cement consisting of measures having a simple payback period of 3 years or less. This is equivalent to potential energy savings of 11% of 1994 energy use for cement making and a savings of 5% of total 1994 carbon dioxide emissions by the U.S. cement industry. Assuming the increased production of blended cement in the U.S., as is common in many parts of the world, the technical potential for energy efficiency improvement would not change considerably. However, the cost-effective potential, would increase to 1.1 GJ/ton cement or 18% of total energy use, and carbon dioxide emissions would be reduced by 16%. See [http://www.osti.gov/energycitations/product.biblio.jsp?osti\\_id=751775](http://www.osti.gov/energycitations/product.biblio.jsp?osti_id=751775)

**Volume:**

**Cost:**

**Implementable:**

**Impacts:**

**Other comments:**

**RCI-79**

**Name:** Net-metering policies

See RCI-55

**Definition:**

Customers who install small solar, wind, biogas, and fuel cell generation facilities (1 MW or less) to serve all or a portion of onsite electricity needs are eligible for CA's net metering program. The utility does not pay for power above the amount of electricity the customer consumes from the utility. Net metering provides additional consumer benefits. Most net metered projects pay little to no charges to interconnect to the utility grid. Qualitative costs are divided into 17 broad categories which include:

1. Costs to mitigate distribution system impacts (e.g. interconnection study, upgrade costs)
2. Utility revenue loss due to displaced usage of transmission and distribution facilities
3. Lower market prices for power, payments for installed capacity
4. Lost power sales opportunities
5. Public benefit and other special surcharges (paid by customers on net rather than total consumption)
6. Utility revenue loss to avoided commodity purchase—energy capacity, standby service, and bonds
7. Costs for enhanced reliability
8. Improved stability and power quality
9. Ancillary services
10. Increased employment and taxes
11. Costs for increased national security
12. Conservation of natural gas
13. Building code or local permitting requirements
14. Loss of utility plant investment revenue
15. Administrative, maintenance, installation costs
16. Special metering
17. Cost of tax and other incentives

A multi-stakeholder effort established uniform interconnection standards for CA's separate public utilities. This allowed for the process to be streamlined. Legislation requires that all electric service providers make net metering available to customers until a cap of 0.5 % of aggregate peak service demand is met. See

[http://www.cpuc.ca.gov/static/energy/electric/051005\\_sgip.htm](http://www.cpuc.ca.gov/static/energy/electric/051005_sgip.htm);

<http://www.eere.energy.gov/greenpower/markets/netmetering.shtml>

**Volume:**

**Cost:**

**Implementable:**

**Impacts:**

**Other comments:**

**RCI-80**

**Name:** Time of Use Rates, Load Management and Curtailment Programs

Are these sufficiently addressed by RCI-5 and RCI-7?

**Definition:**

**Volume:**

**Cost:**

**Implementable:**

**Impacts:**

**Other comments:**

## **Reduce High GWP Gas (HFCs, PFCs, SF6) Emissions**

### **RCI-81**

**Name:** Participation in Voluntary Industry-Government Partnerships

**Definition:**

The Natural Gas STAR Program is a flexible, voluntary partnership between EPA and the oil and natural gas industry. Through the Program, EPA works with companies that produce, process, and transmit and distribute natural gas to identify and promote the implementation of cost-effective technologies and practices to reduce emissions of methane, a potent greenhouse gas. Membership includes CA organizations such as Pacific Gas and Electric. Other Examples of government partnerships include the SF6 Emission Reduction Partnership for Electric Power Systems, a collaborative effort between EPA and the electric power industry to identify and implement cost-effective solutions to reduce sulfur hexafluoride (SF6 ) emissions. SF6 is a highly potent greenhouse gas used in the industry for insulation and current interruption in electric transmission and distribution equipment. Currently over 70 utilities participate in this voluntary program. There is no upfront cost to joining the Natural Gas STAR Program. In fact, partner companies have found that participation in Gas STAR can yield significant economic benefits. While some of the Best Management Practices BMPs do have small incremental costs over standard technologies or processes, they are generally cost effective, and can recoup these costs in as little as 1-2 years. The Natural Gas STAR Program is designed to minimize administrative burden for companies wishing to participate. The amount of time that a company will spend working on the Gas STAR Program depends on the level of involvement a company takes in the program. When current partners were asked to estimate the amount of time a new partner would spend on the Natural Gas STAR Program in the first year of participation, they said that partners would spend only 20-25 hours. That estimate includes reviewing the Memorandum of Understanding (MOU), developing implementation plans, using EPA outreach materials, and all legal and clerical support. After the first year, estimates of annual administrative requirements decrease to fewer than 20 hours per year for annual report preparation. See <http://www.epa.gov/gasstar/>  
[http://www.pge.com/about\\_us/environment/features/climatechange.html](http://www.pge.com/about_us/environment/features/climatechange.html)  
<http://www.epa.gov/electricpower-sf6/>

**Volume:**

**Cost:**

**Implementable:**

**Impacts:**

**Other comments:**

**RCI-82**

**Name:** Process Changes/Optimization

Is this a general description of what is included in the specific options above?

**Definition:**

**Volume:**

**Cost:**

**Implementable:**

**Impacts:**

**Other comments:**

**RCI-83**

**Name:** Leak Reduction /Capture, Recovery and Recycling of Process Gases

The Utah GHG inventory may identify sources of other GHG gases that could be reduced through these kinds of efforts.

**Definition:**

**Volume:**

**Cost:**

**Implementable:**

**Impacts:**

**Other comments:**

**RCI-84**

**Name:** Use of Alternative Gases (other HFCs, hydrocarbon coolants, etc.)

See RCI-83.

**Definition:**

**Volume:**

**Cost:**

**Implementable:**

**Impacts:**

**Other comments:**

**RCI-85**

**Name:** Water pumping and treatment efficiency

**Definition:**

Programs for treatment efficiency are tailored to specific industry types. Examples of previously implemented strategies can be found for electronics, semi-conductor, cleanroom, fume hood, pulp & paper, stone, glass & clay products, and food products industries.

[http://www.energy.ca.gov/process/industry/industry\\_intro.html](http://www.energy.ca.gov/process/industry/industry_intro.html)

**Volume:**

**Cost:**

**Implementable:**

**Impacts:**

**Other comments:**